

The background of the entire page is a composite image. It features several blue-tinted laboratory Erlenmeyer flasks, some of which are out of focus. Overlaid on this is a prominent, glowing red DNA double helix structure that spirals upwards from the bottom right towards the center of the frame. The overall color palette is dominated by blues and reds, creating a scientific and technological atmosphere.

White Paper  
**Healthcare Report**



**HEALTHCARE R&D:**

# **ADDRESSING THE CHALLENGES AND OPPORTUNITIES PRESENTED BY GREATER COLLABORATION**



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## Introduction

Jeremy Deutsch, President – Asia Pacific at Equinix

Emerging technology and shared health challenges have created several key trends and priorities that often transcend nations, systems, organisations and governance models. One of those is the explosion – and the deepening importance – of collaboration and partnership across healthcare and life sciences.

These are increasingly global trends, but Asia-Pacific (APAC) is a microcosm of broader trends in health and an important area to watch, given its diversity and large concentration of ascendant markets.

Home to 60 per cent of the global population, the region has played a leading role in the growth of the pharmaceutical industry, while the healthcare and life sciences industry is poised to be one of the region's fastest-growing sectors. The expected growth is primarily attributed to the need for collaboration among companies to drive innovation for better health outcomes.

Countries all over the world are contending with challenges like the demands of longer life expectancy and ageing populations. In APAC alone, about 25 per cent of the population will be aged 65 years or older by 2025.<sup>2</sup> This puts added strain on health systems, providers and vendors alike. With these ageing populations come separate but related challenges – the rise of complex diseases like diabetes, cancer and heart disease, as well as the management of chronic conditions.

The growing costs of ageing populations and complex diseases are compounded by factors like price controls and funding models.<sup>3</sup> With organisations facing increasing costs and diminishing margins, technology-enabled solutions have become crucial for finding operational efficiencies, reducing workloads and improving health outcomes.

The complex, overlapping nature of these challenges demands multi-disciplinary and collaborative approaches – something of an enduring riddle in healthcare and life sciences due to privacy concerns, data-sharing regulations and overlapping jurisdictions, growing security threats, lagging digital adoption, interoperability challenges and wildly disparate levels of digital maturity across health ecosystems.

These issues aren't new, nor is a greater drive to leverage technology and work collaboratively toward improved clinical outcomes and innovative treatments. Health executives were already signalling plans for greater partnership in 2019, while analysts were predicting massive growth in markets like artificial intelligence (AI) and the Internet of Medical Things (IoMT).<sup>2,4,5</sup> However, growing needs, coupled with lagging digitisation, have created expansive opportunities in healthcare and research and development (R&D) that have yet to be fully explored.

Partnership is necessary to take advantage of those opportunities. Companies in emerging spaces generally lack the reach and advanced capabilities to realise their full potential, and those in emerging medtech are no exception.<sup>4</sup> Meanwhile, companies in life sciences are turning more and more to external partners to pursue R&D far beyond the four walls of their businesses.

**“After a global pandemic has turbo-charged trends of partnerships and acquisitions, there’s never been a greater chance to push through longstanding siloes and realise the multi-disciplinary innovation necessary for meeting the health challenges of today and the future.”**

Jeremy Deutsch, President – Asia Pacific, Equinix





The COVID-19 pandemic has highlighted the importance of quick, effective collaboration with public health responses and searches for vaccines and treatments, triggering a rapid evolution in mindsets and approaches. The urgency of the situation has cut through historically sluggish decision-making processes and compressed actions that might usually take months or years into just a matter of days. It's unlikely that new mindsets or digital adoption will revert to a pre-COVID-19 status quo. And, though they were already driving change with their growing appetite for technology-enabled conveniences, consumers may now be even more inclined toward sharing data.

This is a pivotal moment for healthcare and life sciences. Decision-makers who ignored the growing trend of partnerships and acquisitions were already risking missed opportunities. Now, after a global pandemic has turbo-charged these trends, there's never been a greater chance to push through longstanding siloes and realise the multi-disciplinary innovation necessary for meeting the health challenges of today and the future.

As a result, it will be critical to understand the opportunities, risks and capabilities required.

## Connecting Despite Competition: Healthcare's Upsurge in Partnerships

Greater collaboration has been a long-growing trend in healthcare and life sciences. This includes partnership within and between all manner of pharmaceutical companies, research institutions, governments, healthcare providers and technology vendors – even competitors.

In a 2019 survey by PwC, health executives said their companies are somewhat or likely to acquire, partner or collaborate across sectors in 2020, citing access to technology as the biggest motivation.<sup>5</sup> This tendency was also reflected in studies like the Equinix Global Interconnection Index (GXI) Vol 3, which projected interconnection bandwidth for healthcare and life sciences would achieve a combined annual growth rate of 71 per cent by 2022 – and that was before the COVID-19 pandemic unfolded.<sup>1</sup>

These movements are largely driven by new technology, the demands of increasingly complex health issues and the ability to meet evolving consumer expectations.

Emerging tech like AI, predictive analytics and the IoMT are promising paths to more data-driven, patient-centric and integrated approaches. This sort of emerging tech has garnered increasing interest and cash injections from the world's biggest tech brands. For many years Google, Microsoft and Apple have been partnering with, investing in, and acquiring a variety of organisations in health and life sciences – sometimes even partnering with one another.<sup>6</sup>

Dr Denis Bauer, an expert in machine learning and the transformational bioinformatics leader at the Commonwealth Scientific and Industrial Research Organisation (CSIRO), describes some of these trends as influenced by the cultures and approaches of IT communities themselves.

“As Australia's government research agency, we sit at the nexus of academia, the public sector and commercial entities. So, we sympathise with both the more open knowledge-sharing of researchers and the sometimes more protective approaches of commercial entities.

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**“More collaborative consortia and R&D initiatives typically have an upper hand by increasing the speed of innovation together.”**

Dr Denis Bauer,  
Head of Cloud Computing Bioinformatics, CSIRO

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“However, the latter impulse is starting to fade. Much of this change comes from the IT industry where there's a realisation that, even as a big company, you'll just never get enough developers to compete with the open-source community. And it's the same thing in research spaces where larger, more collaborative consortia typically have an upper hand.

“Additionally, as datasets grow larger and there are more considerations around return time, the adoption of IT practices becomes more widespread and those ideas permeate into life sciences as well.” For example, in a world-first<sup>7</sup>, CSIRO released a Life Science analytics software on a Digital Marketplace, which enables researchers to spin up advanced cloud architectures in a reproducible manner that fosters collaboration.



COVID-19 has impacted this trajectory, with Dr Bauer saying she's seen "unprecedented" levels of knowledge-sharing and collaboration.

This observation is echoed by Equinix President of Asia Pacific, Jeremy Deutsch: "The current pandemic has significantly expedited the need to collaborate to address similar health challenges in the future. Innovation-friendly markets like Singapore, Korea, Australia, Hong Kong and Japan have seen increasing investments, collaborations and partnerships among industry players to gain access to capabilities and expertise within those markets and across the region."

But these are still early days. There are several hurdles that researchers, healthcare providers and life science companies need to overcome to realise the potential of new technology and new mindsets, with many requiring technical solutions, specialist skills and global scale from partners within and beyond health-related sectors.

## Opportunities

Advanced approaches to population health management (PHM) and value-based care are also enabled by greater interconnection and collaboration, which also helps to drive innovation, diversify risks, reduce costs and get treatments to market quicker.

Manufacturing in pharmaceuticals or medical equipment is an instructive example. Even major, fast-tracked breakthroughs or new drugs can hit roadblocks if the company lacks the resources for ramped-up production or distribution.<sup>8</sup> In many countries, especially those that are more reliant on imports, these sorts of complications can hamper innovation and create drug shortage risks.<sup>9</sup>

Strategic partnerships are a critical ingredient in getting new treatments to market quicker and creating more resilient supply chains to protect access to drugs already in market.

And, as this report explores, complex diseases and health needs demand multi-disciplinary knowledge-sharing and technology solutions that help researchers collaborate across ever-larger, more complex datasets.

## Challenges and Requirements

Changing mindsets are helping ease longstanding challenges, while others are surfacing as boundaries are tested and new partnerships are forged. Irrespective of novelty, there are four common hurdles that decision-makers will need to address:

- Regulatory and security requirements can be steep challenges for entities working globally or in

overlapping jurisdictions. Countries, states, regions and even individual organisations all have separate sets of legal standards and different levels of risk aversion which, due to the sensitivity of patient data and medical information, tend to be demanding. Further, cyber threats and privacy concerns are increasingly serious considerations. While the COVID-19 pandemic may have temporarily loosened some restrictions, decision-makers will need to ensure they're investigating the right security strategies, data governance, encryption solutions and local partners to help them navigate new or conflicting processes.

- IT architecture requires strategic design allowing for greater knowledge-sharing, connection or commercial partnerships. Collaboration often sprawls across geographical boundaries and different cloud environments, driving the need to build a point of presence and interconnection between partners in key R&D hubs globally.
- Organisational culture can be just as important a driver as any budget or tech stack. That means groups with historically protective or unilateral approaches may be at a growing disadvantage. Dr Bauer stresses that although many processes and regulatory changes caused by COVID-19 are necessarily temporary, new mindsets and digital transformation will likely endure – which may create more favourable circumstances for reshaping culture and how organisations think about collaboration.
- Multi-cloud presences will be the reality for most large initiatives, especially in research, where there is little time for rebuilding an existing stack with a different provider.

## Case Study

3verest, a cloud services provider with operations spanning Australia, the UK and the US, says "mini consortiums" of joint contracts and competitors have been teaming up to blend best-of-breed offerings and integrated health services.

Though he notes that the trend of more collaborative mindsets predates the COVID-19 pandemic, 3verest's Chief Innovation Officer, Sheraz Bhatti, says 2020 has nonetheless seen collaboration that's more open-minded, rapid and decisive than ever before.

Bhatti offers an example in work with the digital arm of the UK's publicly funded health system, the National Health Service (NHS).

"We power a diagnostic image sharing network for an NHS trust. Initially, this involved around 40 to 50



concurrent users that connected to our cloud and reported on diagnostic images for their hospitals in the trust,” Bhatti says. “By June, we had to provision another 70 workstations and have them deployed and shipped.

“Now, they’ve got almost all their radiologists working from home.

“If you had told me in January that they’d have almost their entire workload at home by May, and that they’d be able to get all the necessary governance clearances ticked off, I wouldn’t have believed you.

“I do think people are more accepting of change now. Sometimes we all tend to put things in the ‘too hard’ basket because it’s a lot of work, but we’re seeing even slow-moving or heavily regulated entities just make those transformations happen out of necessity.”

Bhatti also points to the construction of NHS Nightingale Hospitals<sup>10</sup>, a project with an even greater number of stakeholders, as further evidence of how quickly the trend is growing.

“We worked with NHS Digital and our partners in the construction of one of the Nightingale Hospitals and powered its imaging platforms. Normally, these sorts of projects take months and months, with many of meetings, lots of minute-taking, lots of Gantt charts. This time, due to necessity all of that happened in a week.

“We provisioned everything up within two days and, by day seven, the NHS were testing and we’re fine tuning.”

Bhatti acknowledges that much of the speed came from the urgency of a pandemic response. However, he also anticipates lasting change as organisations witness the tangible benefits of rapid, wide-ranging collaboration.

## Growing Complexity in Health Needs and Clinical Research

Life science research and delivery of care are becoming more complex in ways that already demand the use of technology to help workers manage influxes of data and make connections across data siloes and varied strata of healthcare payers, providers and vendors.

With many countries and companies already looking to PHM and associated technology, connected care is a growing priority despite splintered patient data and ongoing interoperability challenges. This will be especially crucial for the many countries and

populations that are attempting to manage the rising costs and complex, multi-disciplinary demands of aged care.

Electronic patient records, like Singapore’s National Electronic Health Record<sup>11</sup> or Australia’s My Health Record<sup>12</sup>, aim to unify patient data with clinical recommendations from general practitioners, specialists and pharmacists. For digital health, these are often considered starting points, with more sophisticated versions of connected care needing to eventually draw from more data sources around population-specific indicators of health outcomes. Those include lifestyle factors, including nutritional habits or living conditions, that typically sit outside the scope of most existing electronic patient records.

According to Gartner, “Data is at the epicenter of materialising the digital real-time health system with its dynamic capabilities to transform data into value through real-time, responsive, agile and adaptive processes and workflows in care delivery, clinical operations and administration.”

## “A new data and analytics architecture is needed to support digital care transformation.”

Gartner, Drive a New Data and Analytics Architecture to Match Your Digital Healthcare Provider Needs, July 2020

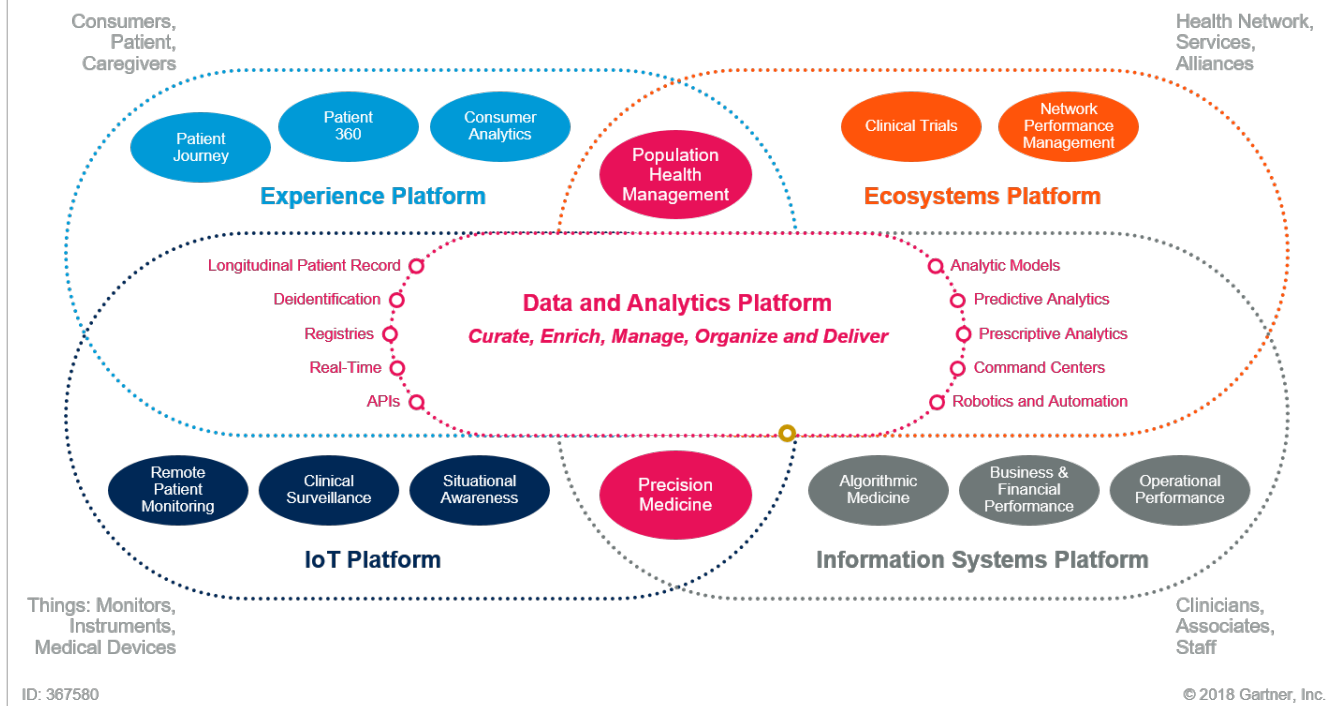
“Deployment of advanced analytics and AI is massively reshaping healthcare. The industry is quickly moving away from static, retrospective analytics to predictive insights and prescriptive real-time action. A new data and analytics architecture is needed to support digital care transformation.”

Mounting complexity doesn’t just impact healthcare delivery. For researchers and pharmaceutical companies, the ability to develop effective treatments and medicines depends on their ability to understand rare and complex diseases like cancer or public health threats like pandemics. These studies demand multidisciplinary collaboration and information sharing, which in turn demand a variety of pipelines and technical solutions for ensuring that data can move between entities.

To do this, government agencies and private companies have been ramping up partnerships, exploring new technologies and pouring investment into R&D.



## Analytics Platform for Real-Time Healthcare



**Source:** Gartner, Drive a New Data and Analytics Architecture to Match Your Digital Healthcare Provider Needs, July 2020, Published 18 December 2018.

Among the top 10 pharmaceutical companies, 2019 projections saw R&D spend exceeding \$200 billion by 2024<sup>13</sup>, while commercial entities, institutions and government agencies are investing heavily in research and clinical applications of emerging technology.

### Opportunities

New medical advances and better patient outcomes are the biggest opportunities. Put simply, they offer the promise of healthier people, more seamless experiences and reduced healthcare costs and workloads.

While the technological and operational challenges might mean that many countries and systems face a long road to better PHM and connected care, improvements promise a more integrated, holistic understanding of a patient's health and answers for the growing, multifaceted challenges of areas like aged care.

Intricate research ecosystems are both positive and necessary for effective responses to new or complex diseases. Collaboration across private, public and

philanthropic sectors facilitate knowledge-sharing between experts, helping them amass and share datasets where isolated bits of information turn into trends and anecdotes become evidence.

### Challenges and Requirements

With larger volumes of data come bigger capacity and infrastructure requirements, which may be harder to reconcile when attempting to collaborate across a variety of environments and levels of digital maturity – particularly for the philanthropic institutions who often lack the same resources as large private companies.

- Appropriate IT architecture and infrastructure will continue to grow in importance as researchers from different organisations attempt to share knowledge and exchange data. For instance, major projects can attract a variety of partners with each one locked in to their own vendor, creating roadblocks to connection. Meanwhile, healthcare systems will need to address persistent technical issues like interoperability, likely requiring closer collaboration with both vendors and policymakers.



- Most countries, including those in APAC, tend to have more stringent privacy requirements and sharing rights when it comes to healthcare and medical data. Even healthcare providers often need to harmonise between different state or local jurisdictions within the same country, while researchers and pharmaceutical R&D must navigate international jurisdictions and security parameters to uncover new findings or build out datasets. Projects require extensive mapping of how data is shared and who will see it, along with local partners who are involved early to highlight risks and other considerations from the outset.
- Cyber threats from criminal groups and other nation states, already a significant concern with attacks like Singapore's 2018 SingHealth data breach<sup>14</sup>, will only become more pronounced as healthcare networks expand and integrate.

## Case Study

It would be hard to find a group of people keener to share and collaborate than those in paediatric cancer research, says Associate Professor Mark Cowley, Computational Biologist at Children's Cancer Institute.

"Paediatric cancer researchers are a sharing bunch. They're all pretty united around a compelling cause – helping children and families affected by childhood cancer."

That's what researchers at the Institute do each day, connecting with other researchers and tapping into increasingly large datasets to spot noteworthy trends and recommend highly personalised treatments. Much of this happens under the Zero Childhood Cancer Personalised Medicine Program<sup>15</sup>, a partnership between Children's Cancer Institute and the Kids Cancer Centre at Sydney Children's Hospital. The Program is a helpful example of how the right foundations and IT strategies are supporting breakthroughs that hold enormous weight for patients and their families.

"We start with a piece of tumour tissue and a whole bunch of molecular analyses. Every patient's tumour is unique and we might pick up different genetic mutations that have different impacts, so we have to look at each one in a multidimensional way.

"There's a computational element to that, but overall this is a very multidisciplinary process. We can't do this without the clinicians and scientists who know all about the different paediatric cancer types. Many different pieces of the puzzle have to be distilled into evidence-based recommendations for the child's treating doctor."

During this process, Cowley says they generate about a terabyte of data per patient for wider research and comparison, creating challenges in storing, analysing and sharing large datasets.

**"The Institute has relied on a flexible, scalable hybrid strategy to not only store petabytes of data but to also share it within different environments."**

Emilio Caspanello, Information and Communications Technology Manager, Children's Cancer Institute

That's where people like Emilio Caspanello play a critical role. As Children's Cancer Institute's Information and Communications Technology Manager, Caspanello says the Institute has relied on a flexible, scalable hybrid strategy to not only store petabytes of data but to also share it within different environments.

"What we are building out is a multi-cloud, hybrid strategy for overcoming the challenges of moving data to different locations. We essentially needed to enable one holistic, secure house using the cloud exchange," says Caspanello.

For researchers like Cowley, it means they can connect with leading institutions regardless of where they are or what cloud provider they use.

"Previously, the people you most want to collaborate with might use a different cloud than you and then you've got siloes of data sitting in separate clouds.

"With the Institute's current strategy, it means we can share pipelines and data with American partners like Saint Jude's Children's Hospital in Memphis or the Children's Hospital of Philadelphia and see if aggregating data can help us find interesting biology about, say, where novel brain cancer subtypes, driven by the same genetic mutation, which may be new drug targets.

"This sort of capability is important because increasingly drugs are becoming targeted to very specific genetic changes. For example, we had a nine-year-old boy whose brain tumour had the same mutation that you find in melanoma, and this melanoma drug called vemurafenib worked spectacularly. He's now pretty much cured of his brain cancer."





## The Emergence of Patient Power

Growing consumer expectations for seamless, user-centric, digital tools and platforms have been driving industries to redesign service delivery for years.<sup>16</sup> This hasn't always been an easy lift within health spaces, often due to complications inherent to the tightly regulated, risk-averse nature of healthcare and medicine. But patient expectations are evolving regardless of whether service providers can keep pace.

As consumers demand choice and digital alternatives, they're already starting to take a more active role in their healthcare. While policymakers and private companies will need to reconcile sometimes conflicting desires for convenience with elevated concerns about privacy and data security, UK research indicates that the COVID-19 pandemic may be causing an uptick in consumer willingness to share their health data.<sup>17</sup>

There are certainly plenty of companies and providers that have prioritised digital transformation and digital self-service in recent years. And various forms of telehealth and telemedicine are seeing massive upswings in interest as consumers grapple with the self-isolation and distancing restrictions of the COVID-19 pandemic. Nonetheless, with such a large, disconnected variety of providers and data sources, many patients still lack access to a truly patient-centric, single-delta experience with their health providers.

### Opportunities

Consumers are likely to play at least a partial role in the proliferation of IoMT devices, including wearables and monitoring devices. For providers, researchers or companies who successfully leverage greater collaboration and emerging technologies, these additional data sources will be an invaluable pool of real-time health information that can fuel predictive, preventive and integrated health care delivery.

For PHM, it may also mean that consumers are more willing to blend data created by healthcare providers or pharmacists with additional information about their lifestyles, nutrition and mental wellbeing – the kind of data that many providers often lack but that can play an integral role in value-based connected care and prevention.

### Challenges and Requirements

3verest's Bhatti cited an unexpected moment of patient participation and the kinds of considerations that

can come with it. After working with a teleradiology application vendor, they saw patients access the medical imaging up to every three hours, impacting network loads and costs.

**“Healthcare providers will need to re-architect IT to access the apps, data, analytics, security and clouds for smart healthcare and create platforms where they can grow revenue and profits.”**

Guy Danskine, Managing Director, Australia, Equinix

“The need for improved patient experience is driving the need for distributed architectures with applications deployed closer to the user base,” explains Guy Danskine, Equinix's Managing Director, Australia. “Healthcare providers will need to re-architect IT to access the apps, data, analytics, security and clouds for smart healthcare and create platforms where they can grow revenue and profits.”

Decision-makers will need to plan carefully as they accommodate and leverage more active patient participation.

- Consumers can sometimes respond to new options or technologies in surprising ways, meaning that teams need to build scalability and elasticity into their strategies.
- Overlapping jurisdictions, privacy regulations and data governance continue to complicate efforts to integrate and build seamless, user-friendly experiences.
- Security is a primary consideration as the increase in devices creates more entry points and opportunities for breaches. A robust cybersecurity strategy is a foundational step in any major project or collaboration.
- Ballooning volumes of data and new devices require low-latency, real-time performance to improve experiences.





## Case Study

A trial launched in Sydney, Australia, demonstrates a possible future for the delivery of care, one where a more active patient is at the centre of a seamless, technology-enabled experience.

Launched in February 2020, and run through a special unit of the Royal Prince Alfred (RPA) Hospital, RPA Virtual established one of the country's first fully virtual hospitals offering a mix of 24/7 services and remote monitoring of patient data.<sup>18</sup> Patients enrolled in the trial can receive care over the phone or through video calling.

But the trial has gone much further than offering telehealth services. Patients are loaned a tablet with an app allowing them to view their health data and sync wearable medical devices. Not only does this allow patients more visibility into their own medical information, but it enables staff to remotely monitor the data through the CarePro platform. This means they can monitor patients and make data-informed decisions about their care, 24 hours a day, without needing hospital admission.

Shortly after launch, RPA Virtual's services ramped up to manage COVID-19 patients from home<sup>19</sup>, which helped reduce risks like overwhelmed hospitals or further spread. Patients were given a pulse oximeter and wearable thermometer so that clinicians could provide them with proactive advice or even take measures like calling an ambulance if data indicated a patient's condition had worsened.

RPA Virtual demonstrates how care may soon shift toward one that simultaneously allows patients a greater role in their care while reducing time-consuming, manual interaction with a fragmented healthcare system. Patients can sync their apps and devices, review their information and proactively seek care from their own homes, all with the peace of mind that remote medical staff are making data-informed decisions to help keep them safe and healthy.

## Conclusion

The R&D necessary for reaching breakthroughs and the everyday delivery of care are both key to addressing many of the multidimensional, increasingly interrelated health challenges in the Asia Pacific region and around the world. This is already evident in heightened collaboration between a variety of sectors and fields, and even commercial entities who are usually competitors.

However, even greater collaboration will be necessary for making sure researchers like the Institute's Mark Cowley can continue to partner with other scientists to identify lifesaving treatments, or to help technology-enabled healthcare delivery like RPA Virtual benefit entire populations rather than a select group of patients. That doesn't just mean high-profile collaboration between tech giants or acquisitions and mergers within pharmaceutical companies – it will also require greater collaboration outside healthcare and life sciences to address the challenges outlined in this report, and to build the right legal and technical foundations.

Just as policymakers will need to partner with a variety of stakeholders to build regulatory frameworks, data governance and security parameters that better enable innovation and connected care, decision-makers will need to collaborate more closely inside their own organisations. Executives must involve IT professionals early to ensure strategies and architecture account for collaboration with external partners. Likewise, they'll need to involve people and culture leaders to help drive the cultural changes and digital transformations, along with establishing on-the-ground partners who can help guide them through local jurisdictions.

Health and life science industries are seeing massive cultural and structural shifts, some of them expedited by urgent health needs and broader societal challenges. Decision-makers in this space have new and unique opportunities to drive positive change, but it will require forward-thinking strategies and working in tandem with a larger variety of partners than ever before to achieve that outcome.



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